
MODIS sensing of aerosol radiative forcing of climate

Example of Data Structure And Collaboration With Modelers

and what is waiting for us behind the algorithm horizon

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Why do we care ? Biggest uncertainty in radiative forcing of climate in the 160 years of climate change research

How MODIS can address the indirect forcing ?

How MODIS can address the direct forcing ?

Lessons learned: Science done on the daily level 3 data set

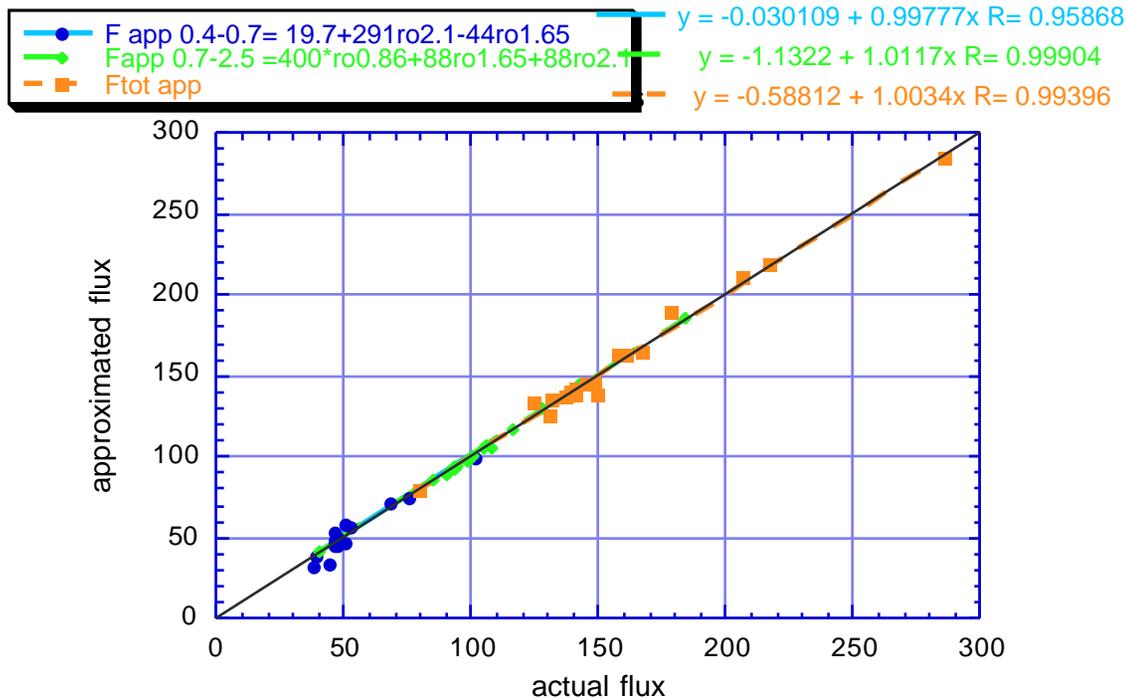
Forming an alliance: satellites - ground network - models

How MODIS can address the indirect forcing ?

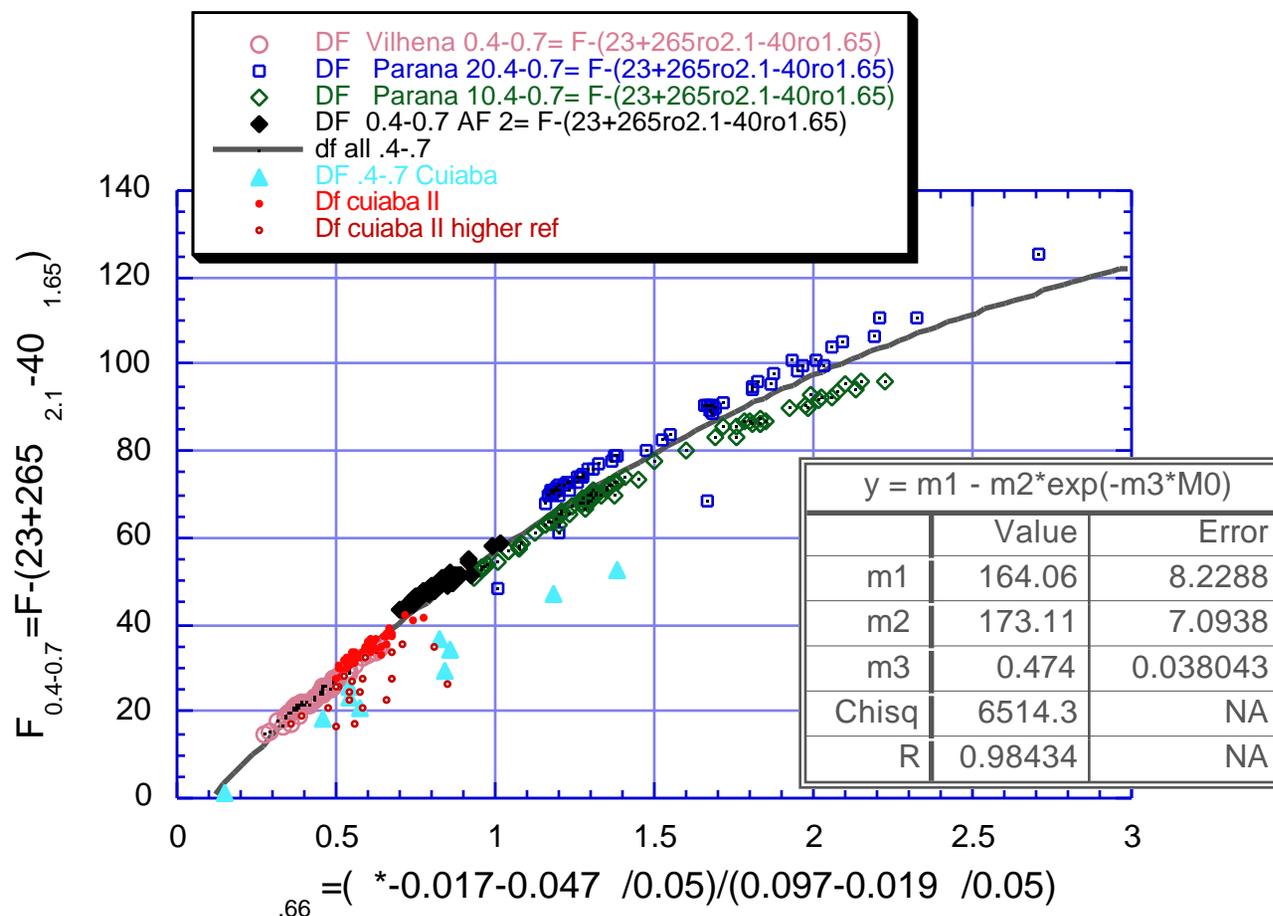
- **MODIS: from single photons to 0.25-1 km analysis: smoke, clouds (T, R_c, c) and water vapor**
- **Summary (through level 2) to daily level 3 data**
- **Statistical display of the interactions between the parameters in a daily 1°x1° grid scale**
- **The role of models -**
~~ingest MODIS information and generate the anticipated answer~~
serve as a crude method to extrapolate MODIS accurate measurements

How MODIS can address the direct forcing ?

- **The unprecedented power behind the spectral information:
Resolve spectrally the surface and aerosol radiative forcing**



Scatter plot between the radiative flux at 0.4-0.7 μm reflected from the surface, and estimated at nadir from the 1.65 and 2.1 μm channels, vs. the actual flux at nadir. The std in the error in F(0.4-0.7 μm) is 4.3 w/m². The optical thickness was derived from the AVIRIS data as 0.09±0.07 .



Scatter plot of the smoke aerosol contribution to the flux at 0.4-0.7 μm escaping to space, measured in several locations in Brazil and the smoke optical thickness.

Lessons learned:

Science done on the daily level 3 data set - summary of parameters and the processes that govern the interaction between them:

The ability of water vapor to control the influence of smoke on clouds.

The direct effect, the indirect effect and the mixed effect - the subpixel clouds and inter-cloud, cloud edge aerosol - models and field experiments have a big problem with that

The effect of this "soup" on radiation

Forming an alliance: satellites - ground network - models

MODIS monitors daily the aerosol main parameters

Ground based observations supplement missing information

Trajectory mass balance models inter/extrapolate the results.